

## **ABSTRACT OF THE DISCLOSURE**

**[0103]** A multichannel neurostimulation device spatially spreads the excitation pattern in the target neural tissue by either: (1) rapid sequential stimulation of a small group of electrodes, or (2) simultaneously stimulating a small group of electrodes. Such multi-electrode stimulation stimulates a greater number of neurons in a synchronous manner, thereby increasing the amplitude of the extra-cellular voltage fluctuation and facilitating its recording. The electrical stimuli are applied simultaneously (or sequentially at a rapid rate) on selected small groups of electrodes while monitoring the evoked compound action potential (ECAP) on a nearby electrode. The presence of an observable ECAP not only validates operation of the implant device at a time when the patient may be unconscious or otherwise unable to provide subjective feedback, but also provides a way for the magnitude of the observed ECAP to be recorded as a function of the amplitude of the applied stimulus. From this data, a safe, efficacious and comfortable threshold level can be obtained which may be used thereafter as the initial setting of the stimulation parameters of the neurostimulation device, or to guide the setting of the stimulation parameters of the neurostimulation device.